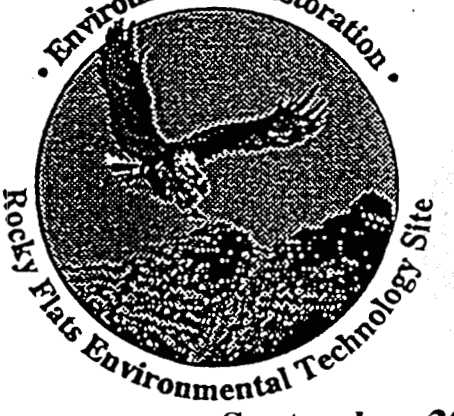
NOTICE

All drawings located at the end of the document.

Data Summary Report
IHSS Group 900-3

KAISER•HILL COMPANY



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ACRONYMS

AL	action level
AR	Administrative Record
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DOE	U.S. Department of Energy
DQA	Data Quality Assessment
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ER	RSOP Environmental Restoration RFCA Standard Operating Procedure
HPGE	high-purity germanium detector
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
K-H	Kaiser-Hill Company L.L.C.
LCS	laboratory control sample
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
mg/kg	milligram per kilogram
MS/MSD	matrix spike/matrix spike duplicate
N/A	not applicable
ND	not detected
PAC	Potential Area of Concern
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
pCi/g	picocurie per gram
POC	Point of Compliance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SD	standard deviation
SEP	Solar Evaporation Ponds
SOR	sum of ratio
SVOC	semi-volatile organic compound
ug/kg	microgram per kilogram
VOC	volatile organic compound
V&V	verification and validation

1.0 INTRODUCTION

This data summary report summarizes characterization activities conducted at Individual Hazardous Substance Site (IHSS) Group 900-3 (904 Pad, IHSS 900-213 [Figure 1]) at the Rocky Flats Environmental Technology Site (RFETS) in Golden, Colorado. Characterization activities were planned and executed in accordance with the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001a) and IASAP Addendum #IA-03-01 (DOE 2002a).

2.0 SITE CHARACTERIZATION

IHSS Group 900-3 information consists of historical knowledge (DOE 1992-2001) and 43 sampling locations with specifications as described in IASAP Addendum #IA-03-01 (DOE 2002a). The sampling specifications for the characterization samples collected are listed in Table 1. Note that the majority of samples were collected from beneath the 904 Pad asphalt. Reported sampling depths exclude the asphalt layer and reflect datum from the top of native soil. The location of these samples and analytical results greater than background means plus two standard deviations or reporting limits is presented in Figure 2 and Table 2. A summary of the analytical results is presented in Table 3. Radionuclide Sum of Ratio (SOR) values are summarized in Table 4. Deviations from planned sampling specifications are presented in Table 5. The raw data, as of September 8, 2003, are enclosed on a compact disc.

Analytical results indicate that No Further Accelerated Action (NFAA) for IHSS Group 900-3 is warranted for the following reasons:

- All but one of the contaminants of concern (COCs) concentrations are less than proposed Rocky Flats Cleanup Agreement (RFCA) Wildlife Refuge Worker (WRW) Action Levels (ALs) (DOE, et al 2002b). An exception includes a single arsenic value (23.7 mg/kg) in surface soil that slightly exceeded the corresponding WRW AL (22.2 mg/kg), Ecological Receptor AL (21.6 mg/kg), and background level (10.09 mg/kg);

- All but one of the COCs are less than RFCA Ecological Receptor ALs (DOE et al 2002b). An exception includes one occurrence of lead in surface soil (56.6 mg/kg) that exceeded the corresponding Ecological Receptor AL (25.6 mg/kg); and

- There is no identified potential to exceed surface water standards at a Point of Compliance (POC) from this IHSS Group.

Approval of this Data Summary Report constitutes regulatory agency concurrence of this IHSS Group as an NFAA. This information and NFAA determination will be documented in the FY03 Historical Release Report (HRR).

2.1 Analytical Results

Several analytes including metals, radionuclides, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) were detected above background levels or laboratory reporting limits (RLs) at the majority of the sampling locations (Figure 2).

As shown in Figure 2, a single arsenic value (23.7 mg/kg) located north of the 904-Pad, exceeds the corresponding WRW AL (22.2 mg/kg). The magnitude of the exceedance is slightly greater than the corresponding background level (10.09 mg/kg).

A single lead occurrence (56.6 mg/kg) in surface soil, located north of the 904-Pad, exceeds the Ecological Receptor AL but is only slightly greater than the background level (54.62 mg/kg).

Because arsenic and lead ALs are only slightly greater than background, it is likely that these metal exceedances above ALs are due to natural variation in soil rather than a contaminant release. Also of note is the absence of associated COCs above ALs. For example, no other metals, radionuclides, or VOCs exceed ALs.

2.2 Sum of Ratios

Sum of ratio (SOR) calculations are based on accelerated action analytical data for the radionuclides of concern (americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238). As shown in Table 4, none of the radionuclide SOR values exceeded one. Therefore, no remedial or management actions are triggered.

3.0 DEVIATIONS FROM PLANNED SAMPLING SPECIFICATIONS

Deviations from the planned sampling specifications described in IASAP Addendum #IA-03-01 (DOE 2002a) are presented in Table 5.

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: 03-RF-01478; JLB-097-03)

Data Summary Report for IHSS Group 900-3

September 2003

Figure 2:

Surface Soil Sample Results Above Background Mean Plus Two Standard Deviations or MDLs at IHSS Group 900-3

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July 2003

CERCLA Administrative Record Document, IA-A-001680

U.S. DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

IA-A-001682

Table 1
IHSS Group 900-3 Characterization Sampling Specifications

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
900-3	900-213	CL37-000	2085116.92	748829.83	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CL37-001	2085108.21	748940.14	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CL38-000	2085109.33	749041.67	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CL39-000	2085107.09	749162.13	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-003	2085202.28	748819.05	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-005	2085139.72	748854.70	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-012	2085319.92	748823.27	0-0.5	Metals	6200

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-014	2085264.42	748855.40	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-016	2085201.87	748891.05	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-018	2085139.31	748926.69	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-025	2085324.13	748887.90	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A
		CM37-027	2085264.01	748927.41	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM37-031	2085322.33	748766.19	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
						Nitrate as N	SW9056/E300.0
		CM37-032	2085200.75	748769.60	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-001	2085201.46	748963.05	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-003	2085138.82	748998.80	0-0.4	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A
		CM38-009	2085326.16	748963.78	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-011	2085263.60	748999.40	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-013	2085201.01	749035.04	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-015	2085138.48	749070.78	0-0.4	Metals	6200
						Radionuclides	HPGe

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-023	2085325.75	749035.78	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-025	2085263.18	749071.46	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-027	2085200.69	749107.08	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-029	2085138.11	749142.68	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A
		CM38-036	2085325.34	749107.76	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM38-038	2085262.77	749143.42	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
		CM39-001	2085200.19	749179.07	0-0.4	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM39-003	2085137.60	749214.67	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM39-008	2085324.91	749179.61	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM39-010	2085262.42	749215.37	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A
		CM39-012	2085169.56	749244.63	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CM39-013	2085296.64	749246.81	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN37-003	2085389.13	748856.15	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN37-009	2085388.72	748928.11	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN37-012	2085427.69	748917.12	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN37-013	2085404.41	748811.76	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN38-003	2085388.31	749000.11	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN38-009	2085382.79	749072.30	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A
		CN38-015	2085387.48	749144.08	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN38-016	2085430.53	749116.01	0-0.5	Metals	6200

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Depth Interval[1]	Analyte	Laboratory Method
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN38-017	2085428.68	749021.97	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN39-005	2085387.08	749216.11	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Cyanide	SW9010B/SW9012A
						Nitrate as N	SW9056/E300.0
		CN39-006	2085436.05	749242.37	0-0.5	Metals	6200
						Radionuclides	HPGe
						VOCs	8260
						Nitrate as N	SW9056/E300.0
						Cyanide	SW9010B/SW9012A

[1] Depth Interval is based on the ground surface as the reference datum. Note that some samples exclude asphalt and/or artificial fill that overlie native soil.

Table 2
Surface Soil Results Greater than Background Mean Plus Two Standard Deviations or Detection Limit

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CL37-000	2085116.92	748829.83	Arsenic	0	0.5	12.7	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	624	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	32.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	155	4	40900	—	18.06	mg/kg
			Iron	0	0.5	34800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	613	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	50	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	241	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	126	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	165	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.19	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	4.02	1.82	351	1600	2.00	pCi/g
CL37-001	2085108.21	748940.14	Arsenic	0	0.5	10.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	744	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	38.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	126	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	523	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	45.9	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	252	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	57.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	122	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.89	1.92	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	1	5.1	3090000	—	NA	ug/kg
			Xylenes (total)	0	0.5	7	10	1000000000	—	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CL38-000	2085109.33	749041.67	Arsenic	0	0.5	16.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	671	98	26400	—	141.26	mg/kg
			Copper	0	0.5	153	4	40900	—	18.06	mg/kg
			Iron	0	0.5	28400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	431	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	43.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	307	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	114	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	115	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.21	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.91	1.78	351	1600	2.00	pCi/g
CL39-000	2085107.09	749162.13	Arsenic	0	0.5	12.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	624	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	33.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	160	4	40900	—	18.06	mg/kg
			Iron	0	0.5	48200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1170	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	48.9	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	221	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	119	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	236	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.29	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	5.10	1.55	351	1600	2.00	pCi/g
			Acetone	0	0.5	10	100	102000000	211000	NA	ug/kg
			Ethylbenzene	0	0.5	21	5.2	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	170	10	1000000000	—	NA	ug/kg
CM37-003	2085202.28	748819.05	Arsenic	0	0.5	14.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	749	98	26400	—	141.26	mg/kg
			Cadmium	0	0.5	4.09	3	962	—	1.61	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Chromium	0	0.5	34.2	20	268	—	16.99	mg/kg
			Copper	0	0.5	122	4	40900	—	18.06	mg/kg
			Iron	0	0.5	44400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1160	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	56.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	495	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	96.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	110	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.27	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	4.07	2.12	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg
CM37-005	2085139.72	748854.7	Barium	0	0.5	901	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	56	20	268	—	16.99	mg/kg
			Copper	0	0.5	145	4	40900	—	18.06	mg/kg
			Iron	0	0.5	52000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1470	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	76.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	638	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	96	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	112	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.54	1.72	351	1600	2.00	pCi/g
			Acetone	0	0.5	10	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	0.9	5.4	3090000	—	NA	ug/kg
CM37-012	2085319.92	748823.27	Barium	0	0.5	661	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	116	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	306	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	56300	2190	307000	—	18037.00	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Manganese	0	0.5	1590	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	99	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	628	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	100	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	121	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.33	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	4.43	1.75	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	1.7	5.2	3090000	—	NA	ug/kg
CM37-014	2085264.42	748855.4	Barium	0	0.5	922	98	26400	—	141.26	mg/kg
			Cadmium	0	0.5	3.09	3	962	—	1.61	mg/kg
			Chromium	0	0.5	53.8	20	268	—	16.99	mg/kg
			Copper	0	0.5	140	4	40900	—	18.06	mg/kg
			Iron	0	0.5	57600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1610	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	66.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	718	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	143	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	130	9	307000	—	73.76	mg/kg
CM37-016	2085201.87	748891.05	Arsenic	0	0.5	11.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	888	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	37.4	20	268	—	16.99	mg/kg
			Copper	0	0.5	158	4	40900	—	18.06	mg/kg
			Iron	0	0.5	45300	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1240	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	514	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	95.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	122	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Acetone	0	0.5	10	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	1	5.3	3090000	—	NA	ug/kg
CM37-018	2085139.31	748926.69	Barium	0	0.5	799	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	33	20	268	—	16.99	mg/kg
			Copper	0	0.5	192	4	40900	—	18.06	mg/kg
			Iron	0	0.5	45400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1320	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	56.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	513	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	114	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	125	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.22	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.00	1.56	351	1600	2.00	pCi/g
			Acetone	0	0.5	15	110	102000000	211000	NA	ug/kg
CM37-025	2085324.13	748887.9	Barium	0	0.5	876	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	72	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	215	90	1550	—	10.91	mg/kg
			Copper	0	0.5	197	4	40900	—	18.06	mg/kg
			Iron	0	0.5	58000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1840	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	92	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	705	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	128	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	125	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.39	1.83	351	1600	2.00	pCi/g
CM37-027	2085264.01	748927.41	Barium	0	0.5	878	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	55.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	114	4	40900	—	18.06	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Iron	0	0.5	50500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1370	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	541	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	149	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	104	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	2.32	2.00	351	1600	2.00	pCi/g
			Acetone	0	0.5	30	110	102000000	211000	NA	ug/kg
CM37-031	2085322.33	748766.19	Arsenic	0	0.5	17.6	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	727	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	135	4	40900	—	18.06	mg/kg
			Iron	0	0.5	37400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	630	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	53.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	98.4	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	197	9	307000	—	73.76	mg/kg
			U-238	0	0.5	2.77	1.39	351	1600	2.00	pCi/g
			Ethylbenzene	0	0.5	9	5.6	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	68	11	1000000000	—	NA	ug/kg
CM37-032	2085200.75	748769.6	Arsenic	0	0.5	17.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	613	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	28.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	150	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	457	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	55.4	12	20400	—	14.91	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Strontium	0	0.5	224	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	113	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	126	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.25	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.05	1.89	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	6	10	1000000000	—	NA	ug/kg
CM38-001	2085201.46	748963.05	Arsenic	0	0.5	12.6	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	743	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	62.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	163	4	40900	—	18.06	mg/kg
			Iron	0	0.5	49800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1180	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	80.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	552	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	120	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	119	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	2.59	1.65	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg
CM38-003	2085138.82	748998.8	Arsenic	0	0.4	12.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.4	601	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	34.9	20	268	—	16.99	mg/kg
			Copper	0	0.4	128	4	40900	—	18.06	mg/kg
			Iron	0	0.4	35500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.4	953	158	3480	—	365.08	mg/kg
			Nickel	0	0.4	46	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	380	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	71.9	31	7150	292	45.59	mg/kg
			Zinc	0	0.4	103	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM38-009	2085326.16	748963.78	Barium	0	0.5	795	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	99.3	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	285	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	59700	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1870	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	94.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	650	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	87.8	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	137	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.29	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	6.50	1.68	351	1600	2.00	pCi/g
CM38-011	2085263.6	748999.4	Barium	0	0.5	680	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	45.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	118	4	40900	—	18.06	mg/kg
			Iron	0	0.5	39500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	988	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	50.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	424	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	89.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	103	9	307000	—	73.76	mg/kg
			U-238	0	0.5	6.25	1.49	351	1600	2.00	pCi/g
CM38-013	2085201.01	749035.04	Arsenic	0	0.5	14.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	706	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	30.9	20	268	—	16.99	mg/kg
			Copper	0	0.5	137	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	651	158	3480	—	365.08	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Nickel	0	0.5	50.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	297	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	82.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	105	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.39	1.96	351	1600	2.00	pCi/g
			2-butanone	0	0.5	19	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	83	110	102000000	211000	NA	ug/kg
CM38-015	2085138.48	749070.78	Barium	0	0.4	355	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	26.3	20	268	—	16.99	mg/kg
			Copper	0	0.4	42.9	4	40900	—	18.06	mg/kg
			Iron	0	0.4	21200	2190	307000	—	18037.00	mg/kg
			Nickel	0	0.4	33.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	183	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	70.9	31	7150	292	45.59	mg/kg
			U-235	0	0.4	0.25	0.18	8	1900	0.09	pCi/g
			U-238	0	0.4	2.91	1.88	351	1600	2.00	pCi/g
			Acetone	0	0.4	50	120	102000000	211000	NA	ug/kg
CM38-023	2085325.75	749035.78	Arsenic	0	0.5	18.7	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	612	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	84.9	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	189	90	1550	—	10.91	mg/kg
			Copper	0	0.5	198	4	40900	—	18.06	mg/kg
			Iron	0	0.5	39600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	626	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	60.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	242	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	119	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	136	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.23	0.12	8	1900	0.09	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			U-238	0	0.5	4.72	1.53	351	1600	2.00	pCi/g
CM38-025	2085263.18	749071.46	Barium	0	0.5	493	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	29.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	104	4	40900	—	18.06	mg/kg
			Iron	0	0.5	24500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	391	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	32.8	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	145	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	91.5	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	83.7	9	307000	—	73.76	mg/kg
			Am-241[1]	0	0.5	4.96	0.37	76	1900	0.02	pCi/g
			Pu-239/240[1]	0	0.5	6.64	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.26	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.28	1.52	351	1600	2.00	pCi/g
			Acetone	0	0.5	80	110	102000000	211000	NA	ug/kg
CM38-027	2085200.69	749107.08	Barium	0	0.5	483	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	24.5	20	268	—	16.99	mg/kg
			Copper	0	0.5	135	4	40900	—	18.06	mg/kg
			Iron	0	0.5	25700	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	571	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	45.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	350	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	71.9	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	83.1	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.21	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.03	1.93	351	1600	2.00	pCi/g
			Acetone	0	0.5	22	110	102000000	211000	NA	ug/kg
CM38-029	2085138.11	749142.68	Arsenic	0	0.5	12.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	595	98	26400	—	141.26	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Chromium	0	0.5	41.7	20	268	—	16.99	mg/kg
			Copper	0	0.5	94.8	4	40900	—	18.06	mg/kg
			Iron	0	0.5	30900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	553	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	39.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	225	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	133	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	105	9	307000	—	73.76	mg/kg
			U-238	0	0.5	2.55	1.23	351	1600	2.00	pCi/g
			2-butanone	0	0.5	23	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	100	110	102000000	211000	NA	ug/kg
CM38-036	2085325.34	749107.76	Arsenic	0	0.5	10.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	638	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	57.9	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	259	90	1550	—	10.91	mg/kg
			Copper	0	0.5	82.1	4	40900	—	18.06	mg/kg
			Iron	0	0.5	28800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1040	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	290	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	124	31	7150	292	45.59	mg/kg
			U-238	0	0.5	2.72	1.90	351	1600	2.00	pCi/g
CM38-038	2085262.77	749143.42	Barium	0	0.5	432	98	26400	—	141.26	mg/kg
			Copper	0	0.5	116	4	40900	—	18.06	mg/kg
			Nickel	0	0.5	47.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	247	20	613000	—	48.94	mg/kg
			U-235	0	0.5	0.24	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	5.09	2.20	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	120	192000000	433000	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-001	2085200.19	749179.07	Acetone	0	0.5	100	120	102000000	211000	NA	ug/kg
			Arsenic	0	0.4	11.5	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.4	755	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	56.5	20	268	—	16.99	mg/kg
			Copper	0	0.4	137	4	40900	—	18.06	mg/kg
			Iron	0	0.4	44900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.4	1030	158	3480	—	365.08	mg/kg
			Nickel	0	0.4	52.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	453	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	132	31	7150	292	45.59	mg/kg
			Zinc	0	0.4	105	9	307000	—	73.76	mg/kg
			U-235	0	0.4	0.14	0.11	8	1900	0.09	pCi/g
			U-238	0	0.4	3.34	1.64	351	1600	2.00	pCi/g
			Acetone	0	0.4	60	110	102000000	211000	NA	ug/kg
CM39-003	2085137.6	749214.67	Arsenic	0	0.5	12.3	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	746	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43	20	268	—	16.99	mg/kg
			Copper	0	0.5	127	4	40900	—	18.06	mg/kg
			Iron	0	0.5	41500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	974	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	54.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	410	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	144	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	112	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.26	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	4.47	2.00	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	120	192000000	433000	NA	ug/kg
			Acetone	0	0.5	100	120	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	1	6.1	3090000	—	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-008	2085324.91	749179.61	Arsenic	0	0.5	12	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	534	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	38.8	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	96.3	90	1550	—	10.91	mg/kg
			Copper	0	0.5	191	4	40900	—	18.06	mg/kg
			Iron	0	0.5	35400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	778	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	36.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	283	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	109	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	98.1	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.13	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	2.04	1.91	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	70	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	0.9	5.6	3090000	—	NA	ug/kg
CM39-010	2085262.42	749215.37	Barium	0	0.5	914	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	34	20	268	—	16.99	mg/kg
			Copper	0	0.5	154	4	40900	—	18.06	mg/kg
			Iron	0	0.5	51000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1580	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	63.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	604	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	102	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	123	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	5.26	0.41	76	1900	0.02	pCi/g
			Pu-239/240 (estimated)	0	0.5	8.61	N/A	50	3800	0.07	pCi/g
			U-238	0	0.5	4.31	1.93	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-012	2085169.56	749244.63	Barium	0	0.5	574	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	21.4	20	268	—	16.99	mg/kg
			Copper	0	0.5	268	4	40900	—	18.06	mg/kg
			Iron	0	0.5	19300	2190	307000	—	18037.00	mg/kg
			Lead	**0**	**0.5**	**56.6**	**7**	**1000**	**25.6**	**54.62**	**mg/kg**
			Nickel	0	0.5	48.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	310	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	62.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	111	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.21	1.57	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	3	11	1000000000	—	NA	ug/kg
CM39-013	**2085296.64**	**749246.81**	**Arsenic**	**0**	**0.5**	**23.7**	**5**	**22.2**	**21.6**	**10.09**	**mg/kg**
			Barium	0	0.5	568	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	61.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	174	4	40900	—	18.06	mg/kg
			Iron	0	0.5	47300	2190	307000	—	18037.00	mg/kg
			Nickel	0	0.5	81.8	12	20400	—	14.91	mg/kg
			Selenium	0	0.5	1.33	1	5110	—	1.22	mg/kg
			Strontium	0	0.5	130	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	166	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	137	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.39	0.23	8	1900	0.09	pCi/g
			U-238	0	0.5	4.39	1.96	351	1600	2.00	pCi/g
CN37-003	2085389.13	748856.15	Barium	0	0.5	813	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	75	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	198	90	1550	—	10.91	mg/kg
			Copper	0	0.5	216	4	40900	—	18.06	mg/kg
			Iron	0	0.5	59900	2190	307000	—	18037.00	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Manganese	0	0.5	1930	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	91.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	712	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	118	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	129	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	3.16	1.61	351	1600	2.00	pCi/g
CN37-009	2085388.72	748928.11	Barium	0	0.5	898	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	81.3	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	232	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	54200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1750	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	81.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	681	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	104	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	127	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.28	0.18	8	1900	0.09	pCi/g
			U-238	0	0.5	3.13	2.31	351	1600	2.00	pCi/g
CN37-012	2085427.69	748917.12	Arsenic	0	0.5	13.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	604	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	34.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	66.6	4	40900	—	18.06	mg/kg
			Iron	0	0.5	30100	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	623	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	27.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	284	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	63.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	108	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			U-235	0	0.5	0.21	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	3.91	1.74	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	2	5.8	3090000	—	NA	ug/kg
CN37-013	2085404.41	748811.76	Arsenic	0	0.5	15.2	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	737	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	28.2	20	268	—	16.99	mg/kg
			Copper	0	0.5	90.2	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	570	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	43.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	246	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	102	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	152	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.14	0.11	8	1900	0.09	pCi/g
			U-238	0	0.5	2.55	1.87	351	1600	2.00	pCi/g
			Ethylbenzene	0	0.5	11	5.9	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	92	12	1000000000	—	NA	ug/kg
CN38-003	2085388.31	749000.11	Arsenic	0	0.5	11.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	739	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	95.7	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	206	90	1550	—	10.91	mg/kg
			Copper	0	0.5	160	4	40900	—	18.06	mg/kg
			Iron	0	0.5	46800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1260	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	85.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	512	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	97	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	111	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	5.13	0.47	76	1900	0.02	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Pu-239/240 (estimated)	0	0.5	7.73	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.19	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	4.05	1.62	351	1600	2.00	pCi/g
CN38-009	2085382.79	749072.3	Arsenic	0	0.5	12.3	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	703	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	69.5	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	105	90	1550	—	10.91	mg/kg
			Copper	0	0.5	125	4	40900	—	18.06	mg/kg
			Iron	0	0.5	36500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	810	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	44.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	322	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	99.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	92.6	9	307000	—	73.76	mg/kg
			Xylenes (total)	0	0.5	7	11	1000000000	—	NA	ug/kg
CN38-015	2085387.48	749144.08	Arsenic	0	0.5	17	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	639	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	56.8	20	268	—	16.99	mg/kg
			Copper	0	0.5	173	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33100	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	607	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	39.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	232	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	120	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	118	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	6.26	0.59	76	1900	0.02	pCi/g
			Pu-239/240(estimated)	0	0.5	15.09	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.19	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.33	2.23	351	1600	2.00	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			2-butanone	0	0.5	50	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	160	110	102000000	211000	NA	ug/kg
			Benzene	0	0.5	3	5.4	205000	—	NA	ug/kg
CN38-016	2085430.53	749116.01	Arsenic	0	0.5	15.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	692	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	25.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	110	4	40900	—	18.06	mg/kg
			Iron	0	0.5	22800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	448	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	32.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	320	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	57.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	114	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	4.52	2.07	351	1600	2.00	pCi/g
CN38-017	2085428.68	749021.97	Arsenic	0	0.5	13.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	605	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	32.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	153	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	447	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	49.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	107	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	120	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.12	0.11	8	1900	0.09	pCi/g
			U-238	0	0.5	3.72	2.74	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	6	11	1000000000	—	NA	ug/kg
CN39-005	2085387.08	749216.11	Arsenic	0	0.5	12.6	5	22.2	21.6	10.09	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Barium	0	0.5	800	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	102	4	40900	—	18.06	mg/kg
			Iron	0	0.5	37600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	728	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	265	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	78.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	93.8	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.28	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	4.02	1.78	351	1600	2.00	pCi/g
			Acetone	0	0.5	120	110	102000000	211000	NA	ug/kg
CN39-006	2085436.05	749242.37	Arsenic	0	0.5	11.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	712	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	27.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	95.8	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	576	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	46.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	116	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	148	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.72	1.84	351	1600	2.00	pCi/g

N/A – Not applicable.
Bold lettering denotes Ecological Receptor Action Level Exceedance.

Table 3
IHSS Group 900-3 Summary of Analytical Results

Media	Analyte Name	Number Samples	Detection Frequency	Mean	Minimum	Maximum	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Unit
Surface Soil	Antimony	43	21%	5.42	3.50	24.80	409	—	N/A	mg/kg
	Arsenic	**43**	**91%**	**11.43**	**2.50**	**23.70**	**22.2**	**21.6**	**10.09**	**mg/kg**
	Barium	43	100%	694.02	355.00	922.00	26400	—	141.26	mg/kg
	Cadmium	43	5%	1.60	1.50	4.09	962	—	1.61	mg/kg
	Chromium	43	95%	46.87	10.00	116.00	268	—	16.99	mg/kg
	Cobalt	43	23%	83.17	45.00	306.00	1550	—	10.91	mg/kg
	Copper	43	100%	145.36	42.90	268.00	40900	—	18.06	mg/kg
	Cyanide, total	43	70%	0.20	0.14	0.35	20400	—	N/A	mg/kg
	Iron	43	100%	39058.14	12900.00	59900.00	307000	—	18037.00	mg/kg
	Lead	**43**	**100%**	**29.89**	**11.30**	**56.60**	**1000**	**25.6**	**54.62**	**mg/kg**
	Manganese	43	100%	917.70	186.00	1930.00	3480	—	365.08	mg/kg
	Nickel	43	100%	56.65	27.20	99.00	20400	—	14.91	mg/kg
	Nitrate as n	43	93%	3.85	2.20	28.00	1000000	—	N/A	mg/kg
	Selenium	43	7%	0.55	0.50	1.33	5110	—	1.22	mg/kg
	Strontium	43	100%	384.40	130.00	718.00	613000	—	48.94	mg/kg
	Tin	43	19%	2.54	2.00	6.61	613000	—	N/A	mg/kg
	Vanadium	43	100%	102.94	36.00	166.00	7150	292	45.59	mg/kg
	Zinc	43	100%	117.70	46.10	236.00	307000	—	73.76	mg/kg
	Am-241[1]	43	9%	2.83	2.30	6.26	76	1900	0.02	pCi/g
	Pu-239/240[1]	43	9%	4.44	2.16	15.09	50	3800	0.07	pCi/g
	U-235	43	72%	0.18	0.00	0.39	8	1900	0.09	pCi/g
	U-238	43	100%	3.45	1.65	6.50	351	1600	2.00	pCi/g
	2-butanone	43	14%	8.01	4.82	50.00	192000000	433000	N/A	ug/kg
	Acetone	43	44%	28.02	4.84	160.00	102000000	211000	N/A	ug/kg
	Benzene	43	2%	0.49	0.39	3.00	205000	—	N/A	ug/kg
	Ethylbenzene	43	7%	1.47	0.51	21.00	4250000	—	N/A	ug/kg
	Naphthalene	43	16%	0.56	0.40	2.00	3090000	—	N/A	ug/kg
	Xylenes (total)	43	19%	9.46	1.26	170.00	1000000000	—	N/A	ug/kg

[1] $Pu^{239/240}$ and Am^{241} results inferred from HPGe Am^{241}
N/A – Not applicable
Bold lettering denotes Ecological Receptor Action Level Exceedance.

Table 4
Radionuclide Sum of Ratio Calculations

Media	Location Code	Depth Start (feet)	Depth End (feet)	WRW SOR
Surface Soil	CM37-003	0	0.5	0.05
	CM37-014	0	0.5	0.00
	CM37-016	0	0.5	0.00
	CM37-027	0	0.5	0.03
	CM38-001	0	0.5	0.04
	CM38-003	0	0.4	0.00
	CM38-011	0	0.5	0.02
	CM38-013	0	0.5	0.01
	CM38-015	0	0.4	0.04
	CM38-025	0	0.5	0.05
	CM38-027	0	0.5	0.03
	CM38-029	0	0.5	0.01
	CM38-038	0	0.5	0.04
	CM39-001	0	0.4	0.03
	CM39-010	0	0.5	0.02
	CN39-005	0	0.5	0.05
	CL37-000	0	0.5	0.04
	CL37-001	0	0.5	0.03
	CL38-000	0	0.5	0.03
	CL39-000	0	0.5	0.05
	CM37-005	0	0.5	0.04
	CM37-012	0	0.5	0.05
	CM37-018	0	0.5	0.03
	CM37-025	0	0.5	0.01
	CM37-031	0	0.5	0.01
	CM37-032	0	0.5	0.04
	CM38-009	0	0.5	0.05
	CM38-023	0	0.5	0.04
	CM38-036	0	0.5	0.01
	CM39-003	0	0.5	0.04
	CM39-008	0	0.5	0.02
	CM39-012	0	0.5	0.01
	CM39-013	0	0.5	0.06
	CN37-003	0	0.5	0.04
	CN37-009	0	0.5	0.04
	CN37-012	0	0.5	0.04
	CN37-013	0	0.5	0.03
	CN38-003	0	0.5	0.04
	CN38-009	0	0.5	0.00
	CN38-015	0	0.5	0.05
	CN38-016	0	0.5	0.04
	CN38-017	0	0.5	0.03
	CN39-006	0	0.5	0.03

Table 5
IHSS Group 900-3 Deviations from Planned Sampling Specifications

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
900-3	900-213	CL37-000	2085116.92	748829.83	0-0.5	0-0.5	CL37-000	2085107.08	748832.02	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CL37-001	2085108.21	748940.14	0-0.5	0-0.5	CL37-001	2085108.19	748940.18	No significant variations.
		CL38-000	2085109.33	749041.67	0-0.5	0-0.5	CL38-000	2085109.31	749041.66	No significant variations.
		CL39-000	2085107.09	749162.13	0-0.5	0-0.5	CL39-000	2085107.08	749162.09	No significant variations.
		CM37-003	2085202.28	748819.05	0-0.5	0-0.5	CM37-003	2085202.28	748819.05	No significant variations.
		CM37-005	2085139.72	748854.70	0-0.5	0-0.5	CM37-005	2085139.72	748854.70	No significant variations.
		CM37-012	2085319.92	748823.27	0-0.5	0-0.5	CM37-012	2085326.98	748819.76	Lateral offset due to the presence of a utility or other impediment.
		CM37-014	2085264.42	748855.40	0-0.5	0-0.5	CM37-014	2085264.42	748855.41	Sample depth variation due to overlying asphalt/fill.
		CM37-016	2085201.87	748891.05	0-0.5	0-0.5	CM37-016	2085201.87	748891.05	Sample depth variation due to overlying asphalt/fill.
		CM37-018	2085139.31	748926.69	0-0.5	0-0.5	CM37-018	2085139.31	748926.69	No significant variations.
		CM37-025	2085324.13	748887.90	0-0.5	0-0.5	CM37-025	2085326.57	748891.76	Lateral offset due to the presence of a utility or other impediment.
		CM37-027	2085264.01	748927.41	0-0.5	0-0.5	CM37-027	2085264.01	748927.41	No significant variations.
		CM37-031	2085322.33	748766.19	0-0.5	0-0.5	CM37-031	2085322.30	748766.23	No significant variations.
		CM37-032	2085200.75	748769.60	0-0.5	0-0.5	CM37-032	2085200.75	748769.57	No significant variations.
		CM38-001	2085201.46	748963.05	0-0.5	0-0.5	CM38-001	2085201.46	748963.05	No significant variations.
		CM38-003	2085138.82	748998.80	0-0.4	0-0.5	CM38-003	2085138.90	748998.69	Sample depth variation due to overlying asphalt/fill.
		CM38-009	2085326.16	748963.78	0-0.5	0-0.5	CM38-009	2085326.16	748963.76	No significant variations.
		CM38-011	2085263.60	748999.40	0-0.5	0-0.5	CM38-011	2085263.60	748999.40	Sample depth variation due to overlying asphalt/fill.
		CM38-013	2085201.01	749035.04	0-0.5	0-0.5	CM38-013	2085201.05	749035.05	Sample depth variation due to overlying asphalt/fill.

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
		CM38-015	2085138.48	749070.78	0-0.4	0-0.5	CM38-015	2085138.49	749070.69	Sample depth variation due to overlying asphalt/fill.
		CM38-023	2085325.75	749035.78	0-0.5	0-0.5	CM38-023	2085325.75	749035.76	No significant variations.
		CM38-025	2085263.18	749071.46	0-0.5	0-0.5	CM38-025	2085263.19	749071.40	No significant variations.
		CM38-027	2085200.69	749107.08	0-0.5	0-0.5	CM38-027	2085200.63	749107.05	No significant variations.
		CM38-029	2085138.11	749142.68	0-0.5	0-0.5	CM38-029	2085138.08	749142.69	No significant variations.
		CM38-036	2085325.34	749107.76	0-0.5	0-0.5	CM38-036	2085325.34	749107.76	No significant variations.
		CM38-038	2085262.77	749143.42	0-0.5	0-0.5	CM38-038	2085262.78	749143.40	No significant variations.
		CM39-001	2085200.19	749179.07	0-0.4	0-0.5	CM39-001	2085200.22	749179.05	Sample depth variation due to overlying asphalt/fill.
		CM39-003	2085137.60	749214.67	0-0.5	0-0.5	CM39-003	2085137.67	749214.69	No significant variations.
		CM39-008	2085324.91	749179.61	0-0.5	0-0.5	CM39-008	2085324.93	749179.76	No significant variations.
		CM39-010	2085262.42	749215.37	0-0.5	0-0.5	CM39-010	2085262.37	749215.40	No significant variations.
		CM39-012	2085169.56	749244.63	0-0.5	0-0.5	CM39-012	2085169.53	749244.61	No significant variations.
		CM39-013	2085296.64	749246.81	0-0.5	0-0.5	CM39-013	2085296.65	749246.84	No significant variations.
		CN37-003	2085389.13	748856.15	0-0.5	0-0.5	CN37-003	2085389.13	748856.12	No significant variations.
		CN37-009	2085388.72	748928.11	0-0.5	0-0.5	CN37-009	2085388.72	748928.12	No significant variations.
		CN37-012	2085427.69	748917.12	0-0.5	0-0.5	CN37-012	2085443.84	748911.19	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN37-013	2085404.41	748811.76	0-0.5	0-0.5	CN37-013	2085422.66	748804.14	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN38-003	2085388.31	749000.11	0-0.5	0-0.5	CN38-003	2085388.31	749000.12	No significant variations.
		CN38-009	2085382.79	749072.30	0-0.5	0-0.5	CN38-009	2085387.90	749072.11	Lateral offset due to the presence of a utility or other impediment.
		CN38-015	2085387.48	749144.08	0-0.5	0-0.5	CN38-015	2085387.49	749144.11	No significant variations.
		CN38-016	2085430.53	749116.01	0-0.5	0-0.5	CN38-016	2085441.61	749117.49	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
		CN38-017	2085428.68	749021.97	0-0.5	0-0.5	CN38-017	2085442.73	749022.70	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN39-005	2085387.08	749216.11	0-0.5	0-0.5	CN39-005	2085387.08	749216.11	No significant variations.
		CN39-006	2085436.05	749242.37	0-0.5	0-0.5	CN39-006	2085436.04	749242.38	No significant variations.

Note: No deviations between the planned and actual analyte suite.

4.0 DATA QUALITY ASSESSMENT

The Data Quality Objectives (DQOs) for this project are described in the IASAP (DOE 2002). All DQOs for this project were achieved based on the following:

- Regulatory agency approved sampling program design (IASAP Addendum #IA-03-01 [DOE 2002a);
- Collection of samples in accordance with the sampling design; and
- Results of the Data Quality Assessment (DQA) as described in the following sections.

4.1.1 Data Quality Assessment Process

The DQA process ensures that the type, quantity and quality of environmental data used in decision making are defensible, and is based on the following guidance and requirements:

- EPA QA/G-4, 1994a, Guidance for the Data Quality Objective Process;
- EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process; Practical Methods for Data Analysis; and
- DOE Order 414.1A, 1999, Quality Assurance.

Verification and Validation (V&V) of the data are the primary components of the DQA. The final data are compared with original project DQOs and evaluated with respect to project decisions; uncertainty within the decisions; and quality criteria required for the data, specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). Validation criteria are consistent with the following RFETS-specific documents and industry guidelines:

- EPA 540/R-94/012, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review.
- EPA 540/R-94/013, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.
- Kaiser-Hill Company, L.L.C.(K-H) V&V Guidelines.
- General Guidelines for Data Verification and Validation, DA-GR01-v2, 2002a.
- V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v2, 2002b.
- V&V Guidelines for Volatile Organics, DA-SS01-v3, 2002c.

- V&V Guidelines for Semivolatile Organics, DA-SS02-v3, 2002d.
- V&V Guidelines for Metals, DA-SS05-v3, 2002e.
- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

This report will be submitted to the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) Administrative Record (AR) for permanent storage.

4.1.2 Verification and Validation of Results

Verification ensures that data produced and used by the project are documented and traceable in accordance with quality requirements. Validation consists of a technical review of all data that directly support the project decisions so that any limitations of the data relative to project goals are delineated and the associated data are qualified accordingly. The V&V process defines the criteria that constitute data quality, namely PARCCS parameters. Data traceability and archival are also addressed. V&V criteria include the following:

- Chain-of-custody;
- Preservation and hold-times;
- Instrument calibrations;
- Preparation blanks;
- Interference check samples (metals);
- Matrix spikes/matrix spike duplicates (MS/MSD);
- Laboratory control samples (LCS);
- Field duplicate measurements;
- Chemical yield (radiochemistry);
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively); and
- Sample analysis and preparation methods.

Evaluation of V&V criteria ensures that PARCCS parameters are satisfactory (i.e., within tolerances acceptable to the project). Satisfactory V&V of laboratory quality controls are captured through application of validation "flags" or qualifiers to individual records. Quality control (QC) samples are summarized and reported relative to two basic metrics: 1) the frequency of QC measurements (e.g., 1 sample per laboratory batch), and 2) the

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results, or performance, of the QC sample analyses. Generally, a minimum number of QC samples must be analyzed, and results must fall within predefined tolerance limits; violation of either of these criteria results in qualification or rejection of the data. Results are discussed relative to RFCA ALs to determine if project decisions are impacted. Based on the V&V criteria, the data quality is acceptable for project decisions.

Raw hardcopy data (e.g., individual analytical data packages) are currently filed by RIN and are maintained by Kaiser-Hill Analytical Services Division; older hardcopies may reside in the Federal Center in Lakewood, Colorado. Electronic data are stored in the RFETS Soil and Water Database (SWD).

Both real and QC data, as of September 8, 2003 are included on the enclosed CD in Microsoft ACCESS 2000 format: (Filename 900-3_090803.mdb, "SWD&LIMS_dqa_real_data_ 900-3_090803" and "SWD&LIMS_dqa_qc_data_900-3_090803".

4.1.3 Accuracy

The following measures of accuracy were evaluated:

- LCS Evaluation;
- Surrogate Evaluation;
- Blanks; and
- Sample MS Evaluation.

Laboratory Control Sample Evaluation

The frequency of Laboratory Control Sample (LCS) measurements, relative to each laboratory batch, is given in Table 6. LCS frequency was adequate based on at least one LCS per laboratory batch. The minimum and maximum LCS results are tabulated by chemical and method for the project. Any qualifications of results due to LCS performance exceeding tolerance limits are captured in the V&V flags, described in the Completeness Section.

Surrogate Evaluation

The frequency of surrogate measurements is given in Table 7. Surrogate frequencies were adequate based on at least one surrogate set per sample. The minimum and maximum surrogate results are also tabulated, by chemical, for the project. Any qualifications of results due to surrogate results are captured in the V&V flags, described in the Completeness Section.

Blank Evaluation

Results of the field blank analyses are given in Table 8. Detectable amounts of contaminants within the field or laboratory blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples above ALs. None of the chemicals detected in blanks were

detected at concentrations in real samples above ALs; therefore, no significant blank contamination is indicated.

Table 6
Laboratory Control Summary

Test Method	CAS	Analyte	Min (%R)	Max (%R)	Number Analytes
SW-846 8260	71-55-6	1,1,1-Trichloroethane	76.93	102.6	8
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	86.85	124	8
SW-846 8260	79-00-5	1,1,2-Trichloroethane	84.53	101.7	8
SW-846 8260	75-34-3	1,1-Dichloroethane	76.06	92.66	8
SW-846 8260	75-35-4	1,1-Dichloroethene	81.85	103.9	8
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	91.21	103.6	8
SW-846 8260	95-50-1	1,2-Dichlorobenzene	92.9	102.2	8
SW-846 8260	107-06-2	1,2-Dichloroethane	76.55	91.81	8
SW-846 8260	78-87-5	1,2-Dichloropropane	85.09	113.5	8
SW-846 8260	106-46-7	1,4-Dichlorobenzene	92.34	102.4	8
SW-846 8260	78-93-3	2-Butanone	53.57	97.77	8
SW-846 8260	108-10-1	4-Methyl-2-pentanone	84.06	119.4	8
SW-846 8260	67-64-1	Acetone	41.12	86.34	8
SW-846 8260	71-43-2	Benzene	82.14	96.97	8
SW-846 8260	75-27-4	Bromodichloromethane	88.29	113	8
SW-846 8260	75-25-2	Bromoform	91.22	128.4	8
SW-846 8260	74-83-9	Bromomethane	53.61	94.04	8
SW-846 8260	75-15-0	Carbon Disulfide	79.54	98.7	8
SW-846 8260	56-23-5	Carbon Tetrachloride	74.34	99.52	8
SW-846 8260	108-90-7	Chlorobenzene	91.17	136.2	8
SW-846 8260	75-00-3	Chloroethane	66.57	105.6	8
SW-846 8260	67-66-3	Chloroform	79.99	96.47	8
SW-846 8260	74-87-3	Chloromethane	53.27	82.93	8
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	67.34	80.35	8
SW9010B OR SW9012A	57-12-5	Cyanide	93	102	8
SW-846 8260	124-48-1	Dibromochloromethane	87.64	97.69	8
SW-846 8260	100-41-4	Ethylbenzene	89.72	122.3	8
SW-846 8260	87-68-3	Hexachlorobutadiene	84.16	103.8	8
SW-846 8260	75-09-2	Methylene chloride	80.66	95.26	8
SW-846 8260	91-20-3	Naphthalene	96.67	108.8	8
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	96	101	12
SW-846 8260	100-42-5	Styrene	90.09	102.2	8
SW-846 8260	127-18-4	Tetrachloroethene	88.11	101.9	8
SW-846 8260	108-88-3	Toluene	90.83	104.9	8
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	89.4	105.2	8
SW-846 8260	79-01-6	Trichloroethene	81.22	106.5	8
SW-846 8260	75-01-4	Vinyl chloride	69.25	102	8
SW-846 8260	1330-20-7	Xylene	90.53	102.9	8

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Table 7
Surrogate Recovery Summary

Number Samples	Analyte	Minimum (%R)	Maximum (%R)
58	1,2-Dichloroethane-D4	87.04	119.2
58	4-Bromofluorobenzene	87.04	130.5
58	Toluene-D8	85.19	110.9

Table 8
Blank Summary

Test Method	CAS No.	Analyte	Maximum	Unit	Number Laboratory Samples	Number Laboratory Batches
SW-846 8260	71-55-6	1,1,1-Trichloroethane	1.05	ug/kg	7	7
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	0.924	ug/kg	7	7
SW-846 8260	79-00-5	1,1,2-Trichloroethane	0.889	ug/kg	7	7
SW-846 8260	75-34-3	1,1-Dichloroethane	0.944	ug/kg	7	7
SW-846 8260	75-35-4	1,1-Dichloroethene	1.42	ug/kg	7	7
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	0.929	ug/kg	7	7
SW-846 8260	95-50-1	1,2-Dichlorobenzene	0.701	ug/kg	7	7
SW-846 8260	107-06-2	1,2-Dichloroethane	0.956	ug/kg	7	7
SW-846 8260	78-87-5	1,2-Dichloropropane	0.821	ug/kg	7	7
SW-846 8260	106-46-7	1,4-Dichlorobenzene	1.06	ug/kg	7	7
SW-846 8260	78-93-3	2-Butanone	9.55	ug/kg	7	7
SW-846 8260	108-10-1	4-Methyl-2-pentanone	8	ug/kg	2	2
SW-846 8260	108-10-1	4-Methyl-2-pentanone	6.47	ug/kg	5	5
SW-846 8260	67-64-1	Acetone	60	ug/kg	7	7
SW-846 8260	71-43-2	Benzene	0.78	ug/kg	7	7
SW-846 8260	75-27-4	Bromodichloromethane	0.655	ug/kg	7	7
SW-846 8260	75-25-2	Bromoform	1.06	ug/kg	7	7
SW-846 8260	74-83-9	Bromomethane	1.53	ug/kg	7	7
SW-846 8260	75-15-0	Carbon Disulfide	2.64	ug/kg	7	7
SW-846 8260	56-23-5	Carbon Tetrachloride	1.12	ug/kg	7	7
SW-846 8260	108-90-7	Chlorobenzene	0.944	ug/kg	7	7
SW-846 8260	75-00-3	Chloroethane	3.72	ug/kg	7	7
SW-846 8260	67-66-3	Chloroform	0.854	ug/kg	7	7
SW-846 8260	74-87-3	Chloromethane	1.33	ug/kg	7	7
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	0.833	ug/kg	7	7
SW9010B OR SW9012A	57-12-5	Cyanide	0.25	mg/kg	4	4
SW9010B OR SW9012A	57-12-5	Cyanide	0.16	mg/kg	2	2
SW-846 8260	124-48-1	Dibromochloromethane	0.695	ug/kg	7	7

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Test Method	CAS No.	Analyte	Maximum	Unit	Number Laboratory Samples	Number Laboratory Batches
SW-846 8260	100-41-4	Ethylbenzene	1.02	ug/kg	7	7
SW-846 8260	87-68-3	Hexachlorobutadiene	1.18	ug/kg	7	7
SW-846 8260	75-09-2	Methylene chloride	1.07	ug/kg	7	7
SW-846 8260	91-20-3	Naphthalene	2	ug/kg	5	5
SW-846 8260	91-20-3	Naphthalene	0.786	ug/kg	2	2
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	5	mg/kg	1	1
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	2.2	mg/kg	4	4
SW-846 8260	100-42-5	Styrene	0.997	ug/kg	7	7
SW-846 8260	127-18-4	Tetrachloroethene	2	ug/kg	1	1
SW-846 8260	127-18-4	Tetrachloroethene	1.21	ug/kg	6	6
SW-846 8260	108-88-3	Toluene	1.25	ug/kg	7	7
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	0.891	ug/kg	7	7
SW-846 8260	79-01-6	Trichloroethene	0.632	ug/kg	7	7
SW-846 8260	75-01-4	Vinyl chloride	2.8	ug/kg	7	7
SW-846 8260	1330-20-7	Xylene	2.49	ug/kg	7	7
SW8260B	67-64-1	Acetone (Field Blank)	10	ug/L	FB	FB

Sample Matrix Spike Evaluation

The frequency of MS measurements was adequate based on at least one MS per laboratory batch. The minimum and maximum MS results are summarized by chemical for the entire project in Table 9. MS recoveries alone do not result in rejection of data. Qualifications due to matrix spike performance are included in the V&V flags summarized in the Completeness Section.

Table 9
Sample Matrix Spike Evaluation

Test Method	CAS No.	Analyte	Min (%R)	Max (%R)
E335.3, E335.4, SM4500-CN C,E	57-12-5	Cyanide	94	98
SW-846 6010	7429-90-5	Aluminum	97	99
SW-846 6010	7439-89-6	Iron	101	103
SW-846 6010	7439-92-1	Lead	98	105
SW-846 6010	7439-93-2	Lithium	102	104
SW-846 6010	7439-96-5	Manganese	97	104
SW-846 6010	7439-97-6	Mercury	95	99
SW-846 6010	7439-98-7	Molybdenum	97	102
SW-846 6010	7440-02-0	Nickel	96	105
SW-846 6010	7440-22-4	Silver	100	103

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Test Method	CAS No.	Analyte	Min (%R)	Max (%R)
SW-846 6010	7440-24-6	Strontium	99	105
SW-846 6010	7440-31-5	Tin	95	100
SW-846 6010	7440-36-0	Antimony	94	101
SW-846 6010	7440-38-2	Arsenic	96	103
SW-846 6010	7440-39-3	Barium	99	105
SW-846 6010	7440-41-7	Beryllium	99	106
SW-846 6010	7440-43-9	Cadmium	97	105
SW-846 6010	7440-47-3	Chromium	100	104
SW-846 6010	7440-48-4	Cobalt	96	103
SW-846 6010	7440-50-8	Copper	95	101
SW-846 6010	7440-62-2	Vanadium	99	104
SW-846 6010	7440-66-6	Zinc	94	98
SW-846 6010	7782-49-2	Selenium	93	102
SW-846 8260	100-41-4	Ethylbenzene	67.46	93.62
SW-846 8260	100-42-5	Styrene	58.37	91.16
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	86.65	125.8
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	66.07	91.85
SW-846 8260	106-46-7	1,4-Dichlorobenzene	40	80.92
SW-846 8260	107-06-2	1,2-Dichloroethane	82.95	108.1
SW-846 8260	108-10-1	4-Methyl-2-pentanone	62.39	94.8
SW-846 8260	108-88-3	Toluene	72.37	90.4
SW-846 8260	108-90-7	Chlorobenzene	63.65	97.87
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	22.93	66.57
SW-846 8260	124-48-1	Dibromochloromethane	65.37	93.73
SW-846 8260	127-18-4	Tetrachloroethene	67.09	86.7
SW-846 8260	1330-20-7	Xylene	66.5188	86.7563
SW-846 8260	56-23-5	Carbon Tetrachloride	78.89	98.77
SW-846 8260	67-64-1	Acetone	105.1	156.3
SW-846 8260	67-66-3	Chloroform	79.58	97.6
SW-846 8260	71-43-2	Benzene	79	96.24
SW-846 8260	71-55-6	1,1,1-Trichloroethane	78.32	99.36
SW-846 8260	74-83-9	Bromomethane	81.21	94.33
SW-846 8260	74-87-3	Chloromethane	90.47	120.7
SW-846 8260	75-00-3	Chloroethane	75.94	89.22
SW-846 8260	75-01-4	Vinyl chloride	74.21	97.3
SW-846 8260	75-09-2	Methylene chloride	82.82	93.91
SW-846 8260	75-15-0	Carbon Disulfide	77.47	88.91
SW-846 8260	75-25-2	Bromoform	61.04	103.4
SW-846 8260	75-27-4	Bromodichloromethane	74.37	96.8
SW-846 8260	75-34-3	1,1-Dichloroethane	87.09	98.57
SW-846 8260	75-35-4	1,1-Dichloroethene	82.32	88.15
SW-846 8260	78-87-5	1,2-Dichloropropane	80.66	101.6
SW-846 8260	78-93-3	2-Butanone	96.15	140.4
SW-846 8260	79-00-5	1,1,2-Trichloroethane	76.7	98.22

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Test Method	CAS No.	Analyte	Min (%R)	Max (%R)
SW-846 8260	79-01-6	Trichloroethene	77.75	99.26
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	64.46	99.13
SW-846 8260	87-68-3	Hexachlorobutadiene	27.58	68.09
SW-846 8260	91-20-3	Naphthalene	23.63	70.04
SW-846 8260	95-50-1	1,2-Dichlorobenzene	38.32	81.26
SW9010B OR SW9012A	57-12-5	Cyanide	87	98
SW9056 OR E300.0	14797-55-8	Nitrate	86	111
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	79	95

4.1.4 Precision

Matrix Spike Duplicate Evaluation

Laboratory precision may be measured through use of the MSD. The frequency of MSD measurements was adequate based on at least one MS per laboratory batch, as shown in Table 10. Repeatability of matrix spike recoveries in soils is generally considered adequate if the relative percent difference (RPD) is less than 35 percent. Although several compounds exceeded 35 percent, these occurrences do not affect project decisions because all related real sample results were repeatable well below ALs.

Table 10
Sample Matrix Spike Duplicate Evaluation

Test Method	CAS No.	Analyte	Number Sample Pairs	Number Laboratory Batches	Maximum RPD (%)
SW-846 8260	71-55-6	1,1,1-Trichloroethane	6	6	7
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	6	6	7
SW-846 8260	79-00-5	1,1,2-Trichloroethane	6	6	9
SW-846 8260	75-34-3	1,1-Dichloroethane	6	6	7
SW-846 8260	75-35-4	1,1-Dichloroethene	6	6	6
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	6	6	48
SW-846 8260	95-50-1	1,2-Dichlorobenzene	6	6	34
SW-846 8260	107-06-2	1,2-Dichloroethane	6	6	8
SW-846 8260	78-87-5	1,2-Dichloropropane	6	6	7
SW-846 8260	106-46-7	1,4-Dichlorobenzene	6	6	32
SW-846 8260	78-93-3	2-Butanone	6	6	11
SW-846 8260	108-10-1	4-Methyl-2-pentanone	6	6	7
SW-846 8260	67-64-1	Acetone	6	6	26
SW-846 6010	7429-90-5	Aluminum	3	3	1
SW-846 6010	7440-36-0	Antimony	3	3	1
SW-846 6010	7440-38-2	Arsenic	3	3	1
SW-846 6010	7440-39-3	Barium	3	3	1
SW-846 8260	71-43-2	Benzene	6	6	9
SW-846 6010	7440-41-7	Beryllium	3	3	2
SW-846 8260	75-27-4	Bromodichloromethane	6	6	9

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Test Method	CAS No.	Analyte	Number Sample Pairs	Number Laboratory Batches	Maximum RPD (%)
SW-846 8260	75-25-2	Bromoform	6	6	20
SW-846 8260	74-83-9	Bromomethane	6	6	16
SW-846 6010	7440-43-9	Cadmium	3	3	3
SW-846 8260	75-15-0	Carbon Disulfide	6	6	7
SW-846 8260	56-23-5	Carbon Tetrachloride	6	6	7
SW-846 8260	108-90-7	Chlorobenzene	6	6	11
SW-846 8260	75-00-3	Chloroethane	6	6	17
SW-846 8260	67-66-3	Chloroform	6	6	9
SW-846 8260	74-87-3	Chloromethane	6	6	15
SW-846 6010	7440-47-3	Chromium	3	3	1
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	6	6	12
SW-846 6010	7440-48-4	Cobalt	3	3	1
SW-846 6010	7440-50-8	Copper	3	3	1
E335.3, E335.4, SM4500-CN C,E	57-12-5	Cyanide	3	3	6
SW9010B OR SW9012A	57-12-5	Cyanide	6	6	2
SW-846 8260	124-48-1	Dibromochloromethane	6	6	9
SW-846 8260	100-41-4	Ethylbenzene	6	6	12
SW-846 8260	87-68-3	Hexachlorobutadiene	6	6	30
SW-846 6010	7439-92-1	Lead	3	3	1
SW-846 6010	7439-93-2	Lithium	3	3	2
SW-846 6010	7439-96-5	Manganese	3	3	2
SW-846 6010	7439-97-6	Mercury	3	3	3
SW-846 8260	75-09-2	Methylene chloride	6	6	8
SW-846 6010	7439-98-7	Molybdenum	3	3	1
SW-846 8260	91-20-3	Naphthalene	6	6	53
SW-846 6010	7440-02-0	Nickel	3	3	1
SW9056 OR E300.0	14797-55-8	Nitrate	2	2	18
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	4	4	6
SW-846 6010	7782-49-2	Selenium	3	3	2
SW-846 6010	7440-22-4	Silver	3	3	1
SW-846 6010	7440-24-6	Strontium	3	3	1
SW-846 8260	100-42-5	Styrene	6	6	27
SW-846 8260	127-18-4	Tetrachloroethene	6	6	11
SW-846 6010	7440-31-5	Tin	3	3	2
SW-846 8260	108-88-3	Toluene	6	6	9
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	6	6	12
SW-846 8260	79-01-6	Trichloroethene	6	6	9
SW-846 6010	7440-62-2	Vanadium	3	3	1
SW-846 8260	75-01-4	Vinyl chloride	6	6	14
SW-846 8260	1330-20-7	Xylene	6	6	16

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Test Method	CAS No.	Analyte	Number Sample Pairs	Number Laboratory Batches	Maximum RPD (%)
SW-846 6010	7440-66-6	Zinc	3	3	1
SW-846 6010	7439-89-6	Iron	3	3	3

Field Duplicate Evaluation

Field duplicate results reflect sampling precision, or overall repeatability of the sampling process. The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent. Table 11 indicates that duplicate sampling frequencies were adequate for all analytical suites except nitrates. Because the AL for nitrates is greater than $1x10^6$ ppm, the disparity in field duplicates does not impact project decisions.

A common metric for evaluating precision is the RPD value; RPD values are given in Table 12. Ideally, RPDs of less than 35 percent (in soil) indicate satisfactory precision. Values exceeding 35 percent only affect project decisions if the imprecision is great enough to cause contradictory decisions relative to the COC (i.e., one sample indicates clean soil whereas the QC partner does not). Analytes exceeding 35 percent RPD and consistently below their respective ALs are repeatable at concentrations below ALs, which does not impact project decisions. If contaminant concentrations exceeded the AL level (e.g., lead), and also exceeded the 35 percent RPD value, then all associated results were reviewed to determine if the magnitude of imprecision could impact project decisions.

The maximum RPD for lead was 41percent. The concentrations of lead ranged up to a 52 percent difference between a real sample and its field duplicate (41 percent RPD). Given this sampling precision, all real samples exceeding 17 mg/kg are qualified with a potential low bias, where the true lead concentration could exceed the Ecological Receptor AL of 25.6 mg/kg, because of sampling process variability.

Table 11
Field Duplicate Sample Frequency

Test Method	Number Real Samples	Number Duplicate Samples	Collection Frequency (%)
GAMMA SPECTROSCOPY	REAL	43	6.98%
GAMMA SPECTROSCOPY	DUP	3	
SW-846 6200	REAL	43	6.98%
SW-846 6200	DUP	3	
SW-846 8260	REAL	43	6.98%
SW-846 8260	DUP	3	
SW9010B OR SW9012A	REAL	43	6.98%
SW9010B OR SW9012A	DUP	3	
SW9056 OR E300.0 PREP E300.0	REAL	43	4.65%
SW9056 OR E300.0 PREP E300.0	DUP	2	

Table 12
Field Duplicate Results

Analyte	Max of Result RPD
1,1,1-Trichloroethane	3
1,1,2,2-Tetrachloroethane	3
1,1,2-Trichloroethane	3
1,1-Dichloroethane	4
1,1-Dichloroethene	3
1,2,4-Trichlorobenzene	3
1,2-Dichlorobenzene	3
1,2-Dichloroethane	3
1,2-Dichloropropane	3
1,4-Dichlorobenzene	3
2-Butanone	4
4-Methyl-2-pentanone	3
Acetone	3
Americium-241	25
Antimony	0
Arsenic	21
Barium	16
Benzene	3
Bromodichloromethane	3
Bromoform	3
Bromomethane	3
Cadmium	0
Carbon Disulfide	3
Carbon Tetrachloride	3
Chlorobenzene	4
Chloroethane	3
Chloroform	3
Chloromethane	3
Chromium	24
cis-1,3-Dichloropropene	3
Cobalt	1
Copper	76
Cyanide	78
Dibromochloromethane	3
Ethylbenzene	4
Hexachlorobutadiene	3
Lead	41
Manganese	13
Methylene chloride	3
Molybdenum	0
Naphthalene	19

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Analyte	Max of Result RPD
Nickel	5
Nitrate	4
Selenium	0
Silver	0
Strontium	4
Styrene	3
Tetrachloroethene	3
Tin	42
Toluene	4
trans-1,3-Dichloropropene	3
Trichloroethene	3
Uranium-235	70
Uranium-238	58
Vanadium	22
Vinyl chloride	3
Xylene	3
Zinc	13
Iron	4

Completeness

The required number of samples were collected in accordance with the approved IASAP Addendum #IA-03-01 (DOE, 2002a). Based on this compliance, and an adequate percentage of validated sample results as explained below, the sample set is considered complete.

Twenty-five percent of the Environmental Restoration (ER) Program's analytical results are targeted for formal validation. Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory practices are consistent with quality requirements. Table 13 shows the number of validated records (codes without "1"), verified records (codes with "1"), and rejected records for each analytical group.

The Validation percentages given in Table 13 indicate that frequency goals were not attained for all analytical suites. However, spot checks on flags applied to radionuclide results in hardcopy data packages indicate at least a 50 percent frequency; the flags have not yet been uploaded to the RFETS SWD. Other analytical suites were verified at relatively high frequencies (greater than 85 percent).

If additional V&V information is received, IHSS Group 900-3 records will be updated in the SWD. Frequency of data qualification and inferences from it will also be assessed as part of the Comprehensive Risk Assessment.

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4.1.5 Sensitivity

Reporting limits, in units of ug/kg for organics, mg/kg for metals, and pCi/g for radionuclides, were compared with RFCA WRW and Ecological Receptor ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect project decisions. Adequate sensitivity is defined as a reporting limit less than an analyte's associated AL, typically less than one-half the AL.

4.1.6 Summary of Data Quality

Data quality is acceptable for project decisions based on the V&V criteria cited and with the qualifications given.

Table 13
Validation and Verification Summary

Qualifier Code	Number Records	Radionuclides (Gamma Spec	Metals-XRF (SW6200)	VOCs (SW8260)	Cyanide (SW9010/9012)	Anions (SW9056/E300)
No V&V	54	54	0	0	0	0
1	75	75	0	0	0	0
J	10	0	10	0	0	0
J1	75	0	62	3	0	10
R1	2	0	0	0	0	2
U1	1	0	0	1	0	0
V	364	54	96	214	0	0
V1	1952	75	589	1266	22	0
JB1	20	0	0	20	0	0
UJ	4	0	2	2	0	0
UJ1	109	0	15	42	21	31
Total	2666	258	774	1548	43	43
Validated	378	54	108	216	0	0
% Validated	14%	21%	14%	14%	0%	0%
Verified	2214	150	666	1312	43	43
% Verified	83%	58%	86%	85%	100%	100%
% Rejected	0.08%	0.00%	0.00%	0.00%	0.00%	4.65%

Key:
1,V1 – Verified
J, J1 - Estimated
UJ1 - Estimated detection limit
V – Validated
R, R1 - Rejected

5.0 REFERENCES

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Kaiser-Hill (K-H), 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v1, December.

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K-H, 2002c, V&V Guidelines for Volatile Organics, DA-SS01-v1, December.

K-H, 2002d, V&V Guidelines for Semivolatile Organics, DA-SS02-v1, December.

K-H, 2002e, V&V Guidelines for Metals, DA-SS05-v1, December.

Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

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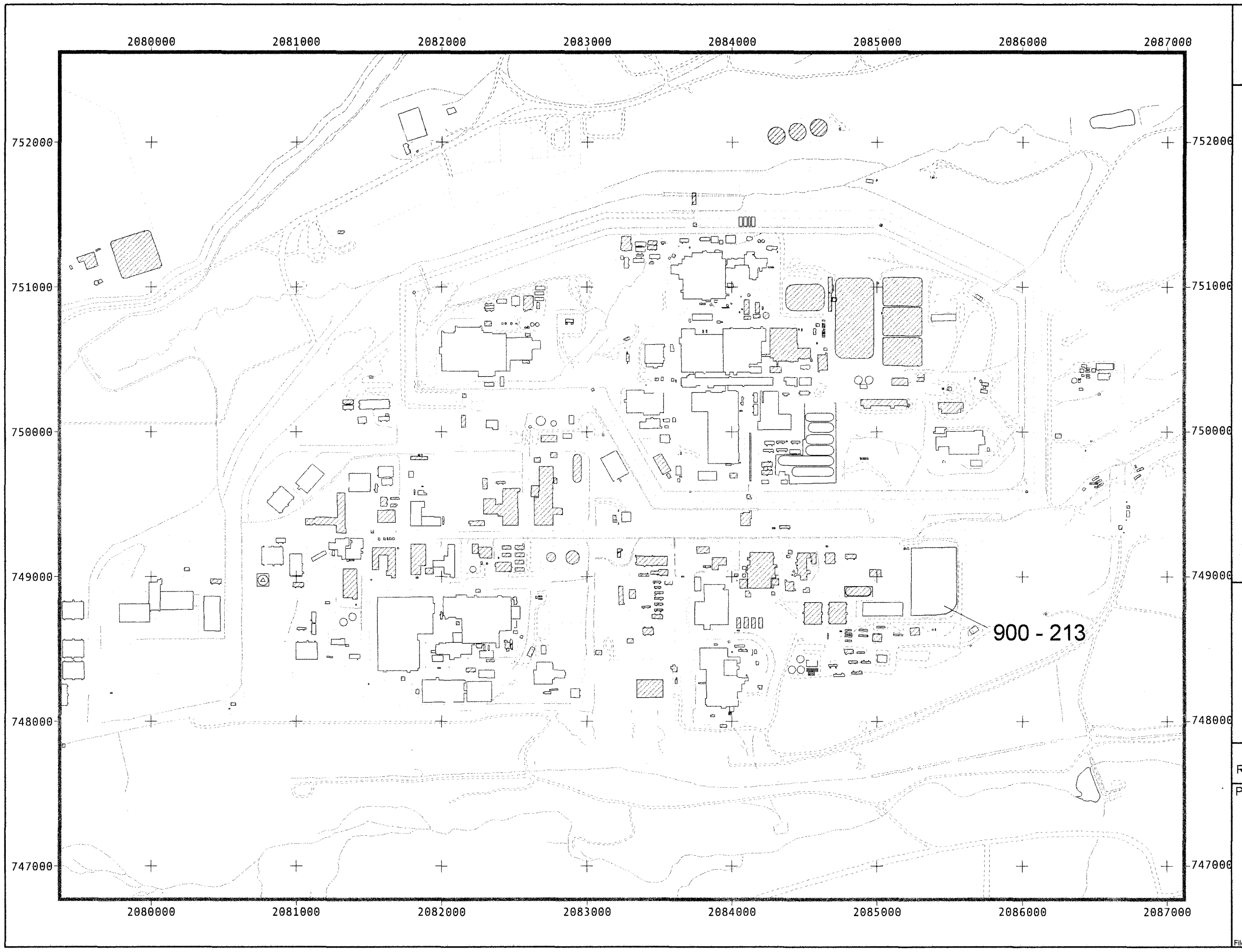
Figure 1

IHSS Group 900-3 Location Map



Key

- Streams
- Fence
- IHSS Group 900-3
- Dirt Road
- Paved Area

Building

- Demolished
- Standing

N
W E
S

500 0 500 Feet

Scale = 1:10,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

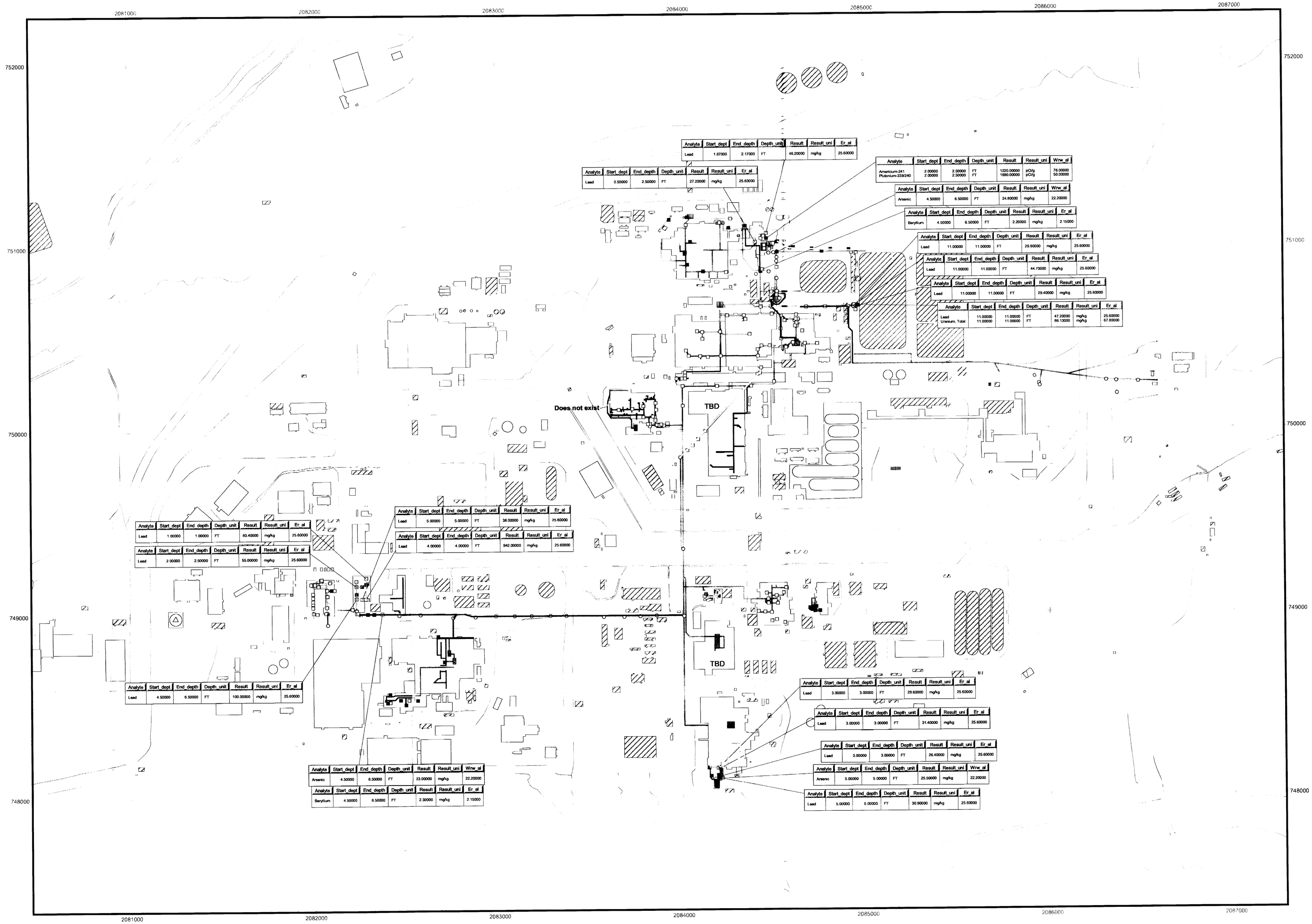
Prepared by: Date: July 2003

RADMS
RESIDUAL ACTION DECISION MANAGEMENT SYSTEM

KAISER•HILL COMPANY

File:w:\Projects\FY2003\900-3\Confirmation\900-3_closeout_dr(rev_1).apr

Figure 4
OPWL Sampling Results Greater Than RFCA Action Levels



KEY

IHSS 000-2 IASAP

- Planned in IHSS 000-2
- WRW AL Exceedance
- Eco AL Exceedance
- Background or DL Exceedance (Does not trigger an accelerated action)
- Less than Background or Detection Limit
- Sampled, data not received
- Action required

Other IHSS Group IASAPs

- Planned in Other IHSS
- WRW AL Exceedance
- Eco AL Exceedance
- Background or DL Exceedance (Does not trigger an accelerated action)
- Less than Background or Detection Limit
- Sampled, data not received
- Action required

- OPWL
- OPWL Removed
- OPWL at 3 feet or overhead line
- OPWL at approximately 3.5 feet
- OPWL between 3 to 5 feet
- Tanks
- UBC
- Paved area
- Dirt road
- Stream, ditch, or drainage

Depth under buildings is measured at native soil beneath concrete and fill

N

200 0 200 400 Feet

Scale = 1:3,000

Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RADMS

Prepared for:

KAISER•HILL COMPANY

File: 000-2characterization4-2-03sps/apr

Date: August 31, 2003